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January 21, 1985

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Mr. Charles Carelli  
Office of Water Programs  
Washington State Department  
of Ecology  
MS PV-11  
Olympia, Washington 98504

Dear Mr. Carelli:

Enclosed is the final report on the Duwamish Industrial Non-Point Source Investigation conducted by Metro under a 205(j) Water Quality Management Planning Grant.

As you will see from the report, Metro went far beyond the original scope of work for the project. A total of 34 industrial sites were visited, where only 10 were required in the scope. Industrial practices have been corrected and voluntary control measures implemented at several sites as a result of Metro visits and recommendations.

Also, 12 storm drains were sampled and four significant sources of toxicants identified. One drain has been cleaned, another stabilized, and continued investigation is needed at the other two.

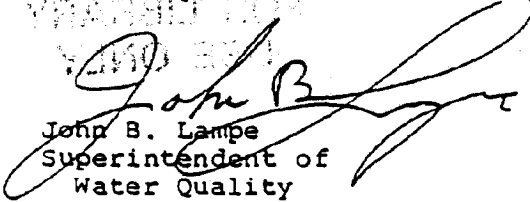
The project has resulted in several positive by-products which were not part of the original plan but are significant in sustaining the Duwamish clean-up effort. Among these were: formation of the Duwamish Industrial Council, a coalition of 18 major industries; formation of the Friends of the Duwamish, a citizen environmental action group; adoption of a city of Seattle Duwamish Public Access Plan; draft of a Port of Seattle Public Access Plan; and increased public and industrial awareness of the conditions and concerns on the Duwamish.

Metro has committed future resources to continue on-site visits and complete a \$30,000 preliminary groundwater assessment in the area. We recommend continuation of the entire project and will work with the WDOE Redmond office to implement recommendations and resolve remaining issues related to the project. We feel this project is vital to future improvements in Elliott Bay and Puget Sound, and will apply for future 205(j) funding as part of this on-going effort.

Mr. Charles Carelli  
January 21, 1985  
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As you read this report, I hope you will conclude, as we have,  
that this has been a most successful and positive project.

Sincerely,

  
John B. Lampe  
Superintendent of  
Water Quality

JBL:mb

Enclosure

## DUWAMISH INDUSTRIAL NON-POINT SOURCE INVESTIGATIONS

### Introduction

Through a § 205(j) grant the Washington Department of Ecology and the U.S. Environmental Protection Agency funded Metro to undertake the Duwamish Industrial Non-Point Source Investigations. Thirty-four industrial facilities were visited and potential non-point sources of toxicants were identified at several locations. Control and clean-up measures are planned or have been implemented for most of them. As part of the investigations, 12 major storm drainage systems were sampled and sources of heavy metals and organic toxicants were identified. One line already has been cleaned and another has been stabilized while source tracing is underway. Investigations are continuing in several other systems.

In addition to the industrial site visits and storm drain sampling, Metro has developed a site visit protocol, a sampling and analysis procedures manual, initiated a groundwater study, maintained its trouble call system, analyzed recent monitoring data from EPA, reviewed numerous environmental documents and permits, participated in discussions about improving public access and continued its community relations program with interested parties.

### History

The recent efforts of Metro in the Duwamish Industrial Non-Point Source Investigation are a continuation of the water quality improvements started 20 years ago. Prior to 1960, years of neglect and a lack of environmental regulation had resulted in a dramatic deterioration of the Duwamish estuary. Direct discharge of municipal and industrial waste had severely degraded water quality of the river. The river sometimes ran red with waste from meat packing plants. Human sewage received minimal treatment at the Diagonal Way treatment plant. In the summer months, dissolved oxygen concentrations occasionally dropped to 1 ppm (The state of Washington's water quality standards require at least 5 ppm to protect salmonid fishes). Air pollution and fugitive dust from factories and vehicles settled on parking lots and was washed into the river with each rain storm. Wetlands were filled with domestic refuse.

The decline of the Duwamish began to be reversed in 1961 with the construction of the Howard Hanson dam by the U.S. Army Corps of Engineers. The dam provided flood protection by storing spring runoff and releasing it over summer months. This, in turn,

provided low flow augmentation needed to raise dissolved oxygen and decrease temperatures for salmonids. Construction of major sewage treatment facilities resulted in improvements in dissolved oxygen and fecal coliforms. Between 1964 and 1967, Metro constructed the East and West Marginal interceptors to divert industrial effluents from the river and transport them to West Point for treatment before discharge to Puget Sound. Removal of industrial wastewater reduced BOD loads and improved the dissolved oxygen. Direct discharge of many toxicants was eliminated. The Diagonal Way plant was closed in 1969 and its effluent was diverted to West Point. Construction of the Renton Treatment Plant in 1965, the removal of the Kent lagoon in 1973 and the Auburn lagoon in 1977 resulted in further improvements in water quality. Since 1970, dissolved oxygen concentrations in the river have been consistently above the 5 ppm standard. Total coliforms in the river have dropped from 100,000 coliforms/100 ml in 1967 to less than 1,000 in 1981. Fecal coliforms have shown a similar decline from 10,000 FC/100 ml (greater than the Seattle King County Health Department's beach closure standard) to less than 100 FC/100 (WDOE Class B standard for contact recreation) in 1983. The growth of population in the Renton treatment plant service areas has caused increased flows from the plant. Residual chlorine and ammonia loads from the treatment plant have increased substantially. Improvements in chlorine removal before discharge from the plant has eliminated this problem and diversion of the Renton effluent to Puget Sound in 1986 will halt the threat of ammonia to the salmon runs.

Air pollution controls required by the Puget Sound Air Pollution Control Authority started in 1968 and have reduced the smokestack emissions and fugitive dust from numerous industries. Due to PSAPCA mandated measures and paving of contaminated parking lots by the city of Seattle, the EPA ambient air standard is met consistently. Airborne lead on Harbor Island has declined from 4 ug/m<sup>3</sup> in 1974 to less than 1 ug/m<sup>3</sup> in 1981.

The Washington Department of Ecology began its NPDES permit system in 1974 regulating the discharge of industrial wastewater to the river. Through permits and inspections, direct discharge in 1984 is limited to small quantities of non-contact cooling water from compressors and surface water runoff. Much of the runoff is treated by oil separators before discharge to the river. Removal of industrial effluents significantly reduced BOD loads (improving dissolved oxygen) and concentrations of several toxicants also declined.

Bans on the manufacture and controls on the use of PCBs have resulted in a decline in the concentrations of PCBs in Duwamish sediments. In the years prior to 1978, sediment concentrations up

to 55 ppm were found. In samples taken after 1978, concentrations slightly more than 4 ppm are found in a few small areas, and most of the river has concentrations less than 1 ppm. Similar declines in fish tissue have been observed. Concentrations of PCBs in Duwamish bottomfish fell from 3 ppm in 1972 to less than 1 ppm in 1980. In 1975, Duwamish coho salmon had 240 ppb PCB; in 1982 it was 49 ppb. The incidence of some biological abnormalities (fin erosion in starry flounder) also declined.

Despite the continuous progress made in improving the Duwamish River especially through the treatment of municipal sewage and the control of point source discharges, the quality of the Duwamish is not sufficient to support its beneficial uses. (Migratory fish rearing, salmon and trout migration, fishing for migratory fish, wildlife habitat, commercial navigation, receive treated wastewater, food web organisms, sightseeing, boating, receive combined sewer overflows, and receive stormwater runoff.) Conventional parameters such as fecal coliforms, BOD, ammonia and temperature are being controlled, but other toxicant sources such as heavy metals and organics are still impacting the river. Skin and liver tumors are common in Duwamish bottomfish. Public access is limited to a few viewpoints. Through a § 208 grant, EPA, WDOE and Metro funded a study to investigate existing and future impacts of water quality on the beneficial uses of the river. The consulting firm of Harper-Owes was retained and their analysis resulted in the report, Water Quality Assessment of the Duwamish Estuary (Metro, 1983).

Based on the conclusions of the report, an 11 point plan was developed with recommendations for actions by Metro, other governmental agencies, industry and citizens to further improve the water quality of the Duwamish. The Metro Council adopted the Duwamish Clean Water Plan in June of 1983. The plan identifies actions to improve water quality in order to support the beneficial uses of the river. Toxicants (both heavy metals and organics), low flow (affecting temperature and dissolved oxygen) and sediment (from upstream erosion) presently impair salmonid rearing, migration and fishing, wildlife habitat, commercial navigation and food web organisms. Specific recommendations of the plan are designed to control and correct the sources of these water quality problems. Some of the toxicants exceed chronic and acute criteria (Ambient Water Quality Criteria, EPA, 1980) and can be found in water column samples, bottom sediments and tissues of Duwamish biota (including salmonids). When compared to Commencement Bay, another heavily polluted waterway in the state, the Duwamish has pollutant loadings several times higher (2-5 times) for most toxicants.

Implementation of the plan began with § 205(j) funded Duwamish Industrial Non-Point Source Investigation. (Appendix A). This report details the progress made in the 18 months since adoption of the plan.

### Site Visits

In 1982 and 1983, EPA collected sediment samples from the entire Duwamish estuary. These samples were analyzed for all of the priority pollutants. This data was plotted on maps (Appendix B) and corroborated the conclusions of the Water Quality Assessment of the Duwamish Estuary that elevated sediment concentrations are not evenly distributed throughout the river. These are definite "hot spots" in the West Waterway and in the blind slips. The parameters of concern are heavy metals (copper, lead, arsenic, zinc and mercury) and organic toxicants (PCBs and PAHs). This detailed data was used to establish priorities for site visits and storm drain sampling.

Because of NPDES permit controls, all point source discharges to the Duwamish have been eliminated, yet significant quantities of heavy metals and toxic organics are still found in Duwamish water, sediment and biota. Further source identification work was necessary to determine what quantities of toxicants are discharged and how they are reaching the Duwamish so that appropriate control measures could be developed and implemented. Industries with facilities adjacent to the Duwamish or nearby were surveyed to determine how they might be contributing to the pollution problems of the estuary. Metro formed a site visit team to assist the industries to identify sources and develop best management practices for control. The available information did suggest some activities (especially shipbuilding and lead smelting) might be possible sources of arsenic, copper and lead burdens in the Duwamish. Other industrial activities including asphalt manufacturing, wood treatment, electroplating and petroleum product storage could be sources of PAHs and heavy metals.

Before the site visits began, a protocol was negotiated (Appendix C) with the Duwamish Industrial Council (DIC), a coalition of the major industrial facilities along the river. Each site visit to a DIC member followed the protocol. Site visits with non-DIC industries were less formal but resulted in implementation of clean-up and control measures.

In order to standardize sampling and analysis procedures for Metro, industry and contract laboratories, a manual was prepared with the concurrence of EPA and DOE (available from Metro). A workshop was held on December 15, 1983 for the industries, agencies and contract laboratories to explain the manual and its use.

Due to the large number of industries located in the Duwamish basin, criteria for selection and prioritization of industrial facilities were developed (Appendix D). The selection criteria were:

1. Industry location relative to areas of the river with elevated concentrations of metals or organics in either the water column, sediment or biota.
2. Correlation of the industrial activity and materials handled on the site to the parameters of concern to the river.
3. Proximity to the river.
4. Size of the facility.
5. NPDES permits
6. Metro's Industrial Waste files
7. Previous trouble calls
8. History of the site
9. Other information if available
10. Willingness of industry to cooperate

Because the Water Quality Assessment of the Duwamish Estuary and the EPA 82/83 data indicated that the distribution of toxicants is not even throughout the estuary, the Duwamish was divided into two zones. (Zone 1: mouth of the river to the Spokane Street bridge, Zone 2: Spokane Street to the Head of Navigation.) Because the most elevated sediment concentrations were found in Zone 1 (especially in West Waterway), the Metro site visits began in this area. A list of industries in Zone 1 is attached (Appendix E).

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A summary of the findings from the 33 industrial facilities visited is attached (Appendix F). Many industries had adequate pollution controls to prevent the discharge of pollutants to the



Duwamish and after the initial discussion and tour of the facility, no follow-up or recommendations were deemed necessary (12 of the 33). Hazardous waste issues were found at three industries and were referred to DOE for resolution: Jorgensen Steel had an unlined, acid wastewater disposal pit adjacent to the river. It has now been closed and the wastewater is hauled away by a tank cleaning service. The lead-contaminated sediments in the Lander Street storm drain (up to 35 percent lead) was removed and taken to a lead smelter in Oregon for recycling. This effort was coordinated with the city of Seattle, DOE and EPA Superfund. The disposal of PCB oil at the Purdy Company's scrap yard was also referred to DOE Hazardous Waste.

Samples were requested at 10 of the industries to determine if certain activities were contributing significant amounts of toxicants to the river and to develop site-specific control measures if necessary. Two industries (Todd Shipyards and Marine Power and Equipment) declined permission for Metro to sample their sandblasting material or respond to Metro's questions about quantities handled. These two shipyards expressed a desire to work with DOE and the matter was referred to DOE for resolution. Samples in the storm drains around the former Harbor Island lead smelter lead to the eventual removal of 20 cubic yards of lead-contaminated sediment. Samples at Seattle Iron and Metal showed that their copper wash facility was contributing significant quantities of heavy metals to a storm drain discharging to the East Waterway. Subsequent monitoring demonstrated that if particulates were separated from the copper wash effluent, the wastewater was not suitable for river discharge through storm sewers, but was acceptable for discharge into the sanitary system. They are presently developing a pretreatment system and will soon divert their wastewater to the sanitary system with a Metro Industrial Waste permit. Sediment from a catch basin at Non-Ferrous Metals was sampled and elevated concentrations of several heavy metals were found. The catch basin was cleaned and follow-up sampling is scheduled. Samples of cooling water discharges from Meltec and Malarkey Asphalt and barge flushing effluent at Manson Construction are being analyzed by the Metro laboratory. Samples were requested from Ash Grove Cement and Duwamish Shipyards and responses from both are pending. During a river survey in April of 1984, samples of Marine Power and Equipment's effluent were collected. Concentrations of copper, lead, arsenic and zinc exceeded the state water quality standards and a \$5,000 fine was levied against that firm. The fine is pending appeal to the Water Pollution Control Hearings Board. Control measures were recommended for fifteen industries. At least six industries have already implemented the suggestions of the Metro site investigation team, and two more are progressing toward implementation. One industry (Leckenby Steel) closed down and controls were no longer necessary.

Before closure of the lead smelter, the area between the smelter

and Lander Street SW was fenced off to prevent RSR vehicles from tracking lead contaminated dirt from the unpaved areas of their yard onto paved areas which drain to the Lander Street storm drain. Lockheed Shipyard designed and implemented a paint overspray control device to prevent paint from falling into the river. Jorgensen Steel updated their DOE NPDES permit and closed the acid pit. Harbor Island Machine Works removed the source of oily runoff to their storm drain sump. Todd Shipyards has moved their spent sandblast material away from the bank of the river and spent \$2.8 million building a new sandblast facility for new ship construction curtailing a possible source of heavy metals. Texaco no longer washes their tank trucks in the wash area next to their oil separator. They have resumed the use of their truck wash facility which discharges to the sanitary system. Northwest Glass has bermed their drum storage area to prevent stormdrain discharge of leakage from barrels of solvents, oils and lubricants.

Groundwater data was requested from four industries, but only Chevron had available reports. Wells have been dug at the Harbor Island lead smelter site and product recovery wells have been dug at Shell, but details of these groundwater studies have not been made available to Metro.

### Storm Drain Sampling

In addition to the industrial site visits, major storm drains were sampled as part of the Metro Industrial Non-Point Source Investigation. In the s 208 study regional runoff from various land use types were analyzed as sources of toxicants to the Duwamish estuary. "Typical" runoff could only account for small percentages of the total loadings to the river. The available data did indicate that certain stormdrains were not "typical" and could be contributing significant loadings to the river. Most of the Duwamish basin is served by separated systems and most storm water is discharged directly to the river untreated. Using the city of Seattle's storm drainage maps and known sediment hot spots, 12 major storm drains were sampled (see map at end of report). Using a limited number of sediment and water samples in the major tributaries of each of the 12 systems, Metro found sources of metals and organic toxicants originating in industrial facilities inland, away from the banks of the river.

Of all the systems sampled, four in particular had elevated concentrations of heavy metals and organic toxicants. The Lander Street drain on Harbor Island was a significant contribution of lead to the West Waterway. Boeing and Seattle City Light are searching for the source of PCBs in the Georgetown Flume. A second set of samples were taken at Florida Street SW to identify sources of metals, PAHs and PCBs. Follow-up monitoring at Fox

Street South is necessary to determine sources of heavy metals.

Based on the elevated concentrations of lead (13,000 ppm) found in the West Waterway at the Lander Street storm drain and studies by PSAPCA indicating contamination of street dust on Harbor Island up to 18 percent lead (180,000 ppm), Metro sampled the two storm drains which discharges into the river at Lander Street. One small (21") drain is privately owned and another line (48") collects stormwater from the center of Harbor Island including the area around the lead smelter. Composite samples of stormwater were collected on February 14, and sediment grabs were collected on March 20, 1984. Lead concentrations in the stormwater exceeded the EPA acute criteria for lead and sediment concentrations in the larger system were 24 to 37 percent lead (240,000 to 370,000 ppm). Based on rough estimates, the annual loading to the Duwamish from the large drain is approximately  $1.4 \times 10^3$  kg/year or 22 percent of the lead in the West Waterway which cannot be attributed to upriver sources.

Because the smelter has ceased operation and the parking lot paving by the city of Seattle has been completed, the existing sources of lead-contaminated dust on Harbor Island have been corrected and Metro recommended that the storm drain sediment be removed to prevent its eventual discharge to the Duwamish. Metro facilitated meetings with EPA Superfund, DOE, the city of Seattle and Sea Fab Metals, present owners of the smelter. From October 24 through October 27, 1984, city of Seattle Engineering crews removed 20 cubic yards of sediment from the line and Sea Fab will ship the sediment to a smelter in Oregon where the lead will be recovered.

EPA sampling of Slip 4 sediments in 1982 and 1983 indicated that PCBs, PAHs and lead had accumulated in the sediments at the head of the slip near the discharge of several storm drainage systems. The sample at the head of the slip is one of the very few where PCBs (3.7 ppm Aroclor 1254) were found in the entire Duwamish. The concentration of lead was one of the highest found outside of the West Waterway. The concentrations of these toxicants decreased with distance away from the head of the slip indicating that the drains might be a source of the toxicants. Four storm drainage systems discharge into Slip 4. One of them, the Georgetown flume, was formerly used by the Seattle City Light's Georgetown Steam Plant to return condensate water back to the river. Samples taken in the flume by Metro in August of 1982 and City Light in August of 1983 found concentrations of PCBs four to eight times higher than in the slip. The results were discussed with City Light and the Boeing Company (several Boeing Company and Boeing Field storm drains also discharge into the flume). Metro sampled the sediment in the slip and water in the drains in April of 1984. In May of 1984 sediment samples were collected

from five stations in the drains. City Light and Boeing also sampled soils and storm drain sediments on their facilities. The Metro samples confirmed the presence of PCBs in the flume at levels of 18 to 159 ppm. Boeing samples of a fire pit had concentrations of PCBs of less than 1 ppm. City Light sampled a detention basin/blow down area and underground storage tanks and found concentrations less than 1.5 ppm PCB. City Light composite samples in the detention basin had 0.6 to 403 ppm PCB and one core sample had 1662 ppm. Boeing sampled a storm drainage system on their property which collects some of the runoff from the City Light detention basin and found PCB concentrations of 360 to 580 ppm. One catch basin upstream of the detention basin runoff had only 9 ppm indicating that the City Light detention basin was the major source of PCBs. City Light has subsequently resampled the detention basin to determine the area of soil to be removed and has also resampled the flume to determine if there are additional sources of PCBs to the flume. As a temporary control measure, they have covered the detention basin to prevent further contamination of runoff and they have also installed weirs in the flume to trap sediment and prevent its transport to Slip 4. The Metro samples of April and May of 1984 indicated that the two of the other drains were contributing PCBs, PAHs and metals to the river. Follow up monitoring on Boeing property and King County Airport (Boeing field) is necessary to determine the sources.

Because of the elevated concentrations of toxic metals and organics found in the sediments at the mouth of the West Waterway, and the knowledge that EPA has alledged that the Wyckoff pole treatment facility had illegally used this storm drainage system for the disposal of wastewater, the Florida Street SW storm drainage system was sampled in April of 1984. The tributary underneath 26th Avenue SW and the small city of Seattle combined sewer overflow had low concentrations of PCBs, PAHs and metals. The line under Florida Street, however, had elevated concentrations of all three toxicants. Upstream of Wyckoff, chromium, copper and nickel are elevated two to five times greater than typical Duwamish street dust; downstream of Wyckoff, copper increases to 10 times greater than street dust and lead and zinc double concentration. Arsenic is elevated in the Florida Street drains to levels six to nine times greater than street dust. Very high concentrations of PCBs were found throughout the line under Florida Street. The highest were upstream of Wyckoff (229 ppm) and declined as the line heads toward the West Waterway (from 190 ppm to 130 ppm) indicating a source near the junction of Florida Street and Harbor Avenue. Then PCBs were primarily Aroclor 1254 and 1260 which are mostly used in electrical equipment (transformers and capacitors). The 1983 EPA sampling as of the sediment of the west bank of the West Waterway near the discharge of the Florida Street drain had 31 ppm PCB 1254 and a trace of 1260. This is one of the few places where EPA found PCBs in the entire river (Slip 4 was one of the others). Of all the storm drain samples collected by Metro in the entire Duwamish study, none had PAH concentrations as high as

the line under Florida Street. Total PAHs varied between 57 and 161 ppm. All of these concentrations are higher than the 21 ppm found by EPA in the river. Because of the varying concentrations of PAHs and different ratios of high molecular weight PAHs (combustion by-products) and low molecular weight PAHs (petroleum hydrocarbons), it was difficult to determine sources to the line. The system was resampled in October of 1984 with seven additional stations at Florida Street.

The results of the first sampling were shared with the EPA Criminal Enforcement Unit which is investigating Wyckoff. A site visit was scheduled with the Purdy Company, a scrap yard upstream of Wyckoff. Purdy has handled electrical transformers in the past and the waste oil has been spilled onto the ground on their facility.

### Trouble Calls

Metro, in conjunction with several other agencies, operates the Interagency Trouble Call Response System, to respond to crisis and non-crisis calls for water quality problems in the region's rivers, streams, lakes, Puget Sound and groundwaters. Through the course of this study, Metro received 18 trouble calls on the Duwamish system. Of these, Metro sent out field investigators to seven of them. One was a request for information. The others were referred to the appropriate agencies for response. Resolution of two particular trouble calls will result in significant water quality improvements. Metro and DOE have received numerous calls regarding sandblast waste causing visible slicks in Slip 3. Because the suspected activity usually occurred at night, it was difficult to collect samples and determine the source. Several warning letters were sent by DOE to Marine Power and Equipment regarding their sandblast operations, but no response was received. In April of 1984, a Metro field crew was collecting samples near Slip 3 and observed dark-colored effluent originating from the storm drains on Marine Power's dock. Samples of the effluent and the receiving water were collected and analyzed by Metro. The effluent exceeded the EPA acute criteria for copper, lead, arsenic and zinc. Using the data, DOE issued a fine of \$5,000. An appeal was denied and a hearing is scheduled for the Water Pollution Control Hearing Board.

Consistent complaints have been received from the Spokane Street Bridge tender who has reported milky white discharges from the Spokane Street storm drain. The Metro site visit team investigated Columbia Cement and Asahipen Paint, but both facilities have adequate pollution controls and did not appear to be sources of the discharge. In October of 1984, Metro received

another complaint. The source was finally traced to Mono Roofing who was discharging asphalt roofing wastewater and solvents into a storm drain. A sample of the effluent exceeded the EPA acute criteria for copper and zinc and the chronic criteria for lead and chromium. DOE was informed and they will require pollution controls to prevent future storm drain discharge of the wastewater.

### Groundwater

In addition to non-point sources such as stormwater runoff, fugitive dust and accidental spills, groundwater could be contributing significant loadings of toxicants to the Duwamish River. Because there has never been a comprehensive examination of groundwater of the Duwamish basin, a work plan was developed (Appendix H) for a consultant to research the historical dredge and fill activities of the lower Duwamish, review present and historical groundwater disposal practices by industries, evaluate the existing groundwater studies and develop a scope of work to fill in the data gaps necessary to understand the dynamics of groundwater in the lower Duwamish and how groundwater may be a significant source of toxicants. Metro hired the consulting firm of Sweet-Edwards and a final report is expected in March of 1985.

### Environmental Document Review

Metro also reviews relevant environmental documents such as city of Seattle Shoreline Management Program permits, Army Corps of Engineers dredging permits and environmental impact statements from a wide variety of agencies. Each project is evaluated as to its potential impact on water quality of the Duwamish. In the past 18 months written comments on 19 Corps permits, 13 Master Use permits and one EIS were sent to the appropriate agencies.

### Public Access

The Duwamish Clean Water Plan recommended that street ends and right-of-ways be evaluated for potential development as parks and/or boat ramps to improve limited public access to the river. Since adoption of the plan, significant progress has been made to improve public access to the Duwamish. The Friends of the Duwamish, a citizen activist group formed in response to the Duwamish Clean Water Plan, were successful in convincing the city of Seattle to impose a moratorium on future street vacations on the banks of the river until a new public access plan was drafted and adopted. Such a plan was presented and adopted following extensive public review and participation. The policy attempts to reconcile demands for industrial development land consolidation with the need for public access to the river. In

return for permanent public access to the river, the city would vacate street-ends for industrial use - mainly by the Port of Seattle for container terminals.

In response to this plan, the port retained a consultant and is presently developing a public access plan to address the needs and requirements of the city. That plan was presented at a public meeting in November of 1984 and is scheduled for adoption in the first months of 1985. The plan only partially addressed the future of Kellogg Island, (Preservation of wetland habitats was another recommendation of the Duwamish Clean Water Plan.) and this drew most of the attention from citizens, environmental groups and media. Also, the Boeing Company, Friends of the Duwamish, Metro and other governmental agencies are working to develop a multi-purpose trail along the west bank of the river, partially in conjunction with Metro's effluent transfer system.

### Public Participation

Throughout the planning and implementataion of the Duwamish Clean Water Plan, Metro has worked to involve the public in the process. Several tours of the river were organized by Metro, both for the media and interested parties. Metro staff routinely attends and participates in the Friends of the Duwamish meetings, and has presented periodic updates to the Citizen Water Quality Advisory Committee Task Force on the Duwamish, and to the Duwamish Industrial Council. The Duwamish project has also been the subject of numerous articles in the Seattle media, including the KING TV "Top Story" and the "Pollution in Paradise" documentary, and in Metro publications as well.

### Conclusions

The original 205(j) work plan required 10 site visits by the Metro team. As of December 15, 1984, 34 sites were visited. Many required no further control measures. Several industries have already implemented recommended control measures to prevent discharge of toxicants through non-point sources. Samples were collected at several facilities and based on the analysis, recommendations were proposed to several industries. All but two industries cooperated with Metro. Although not all of the recommendations have been implemented yet and there are at least 30 more industries which should be visited, the program has been successful in heightening the concern of all industries along the Duwamish. Implementation of the recommended control measures should improve the water and sediment quality of the Duwamish. Further work is necessary to ensure implementation of the recommendations and to complete the site visits.

The storm drain sampling resulted in the identification of four significant sources of toxicants. One has already been resolved; one has been stabilized to prevent further contamination; another has been resampled to identify sources and follow up monitoring is required in a fourth. Based on the findings of Metro site visits, there are several additional storm drains which should be sampled. This effort has also been valuable in determining additional industries for site visits.

The 205(j) funded study also resulted in several products which were not part of the original work plan:

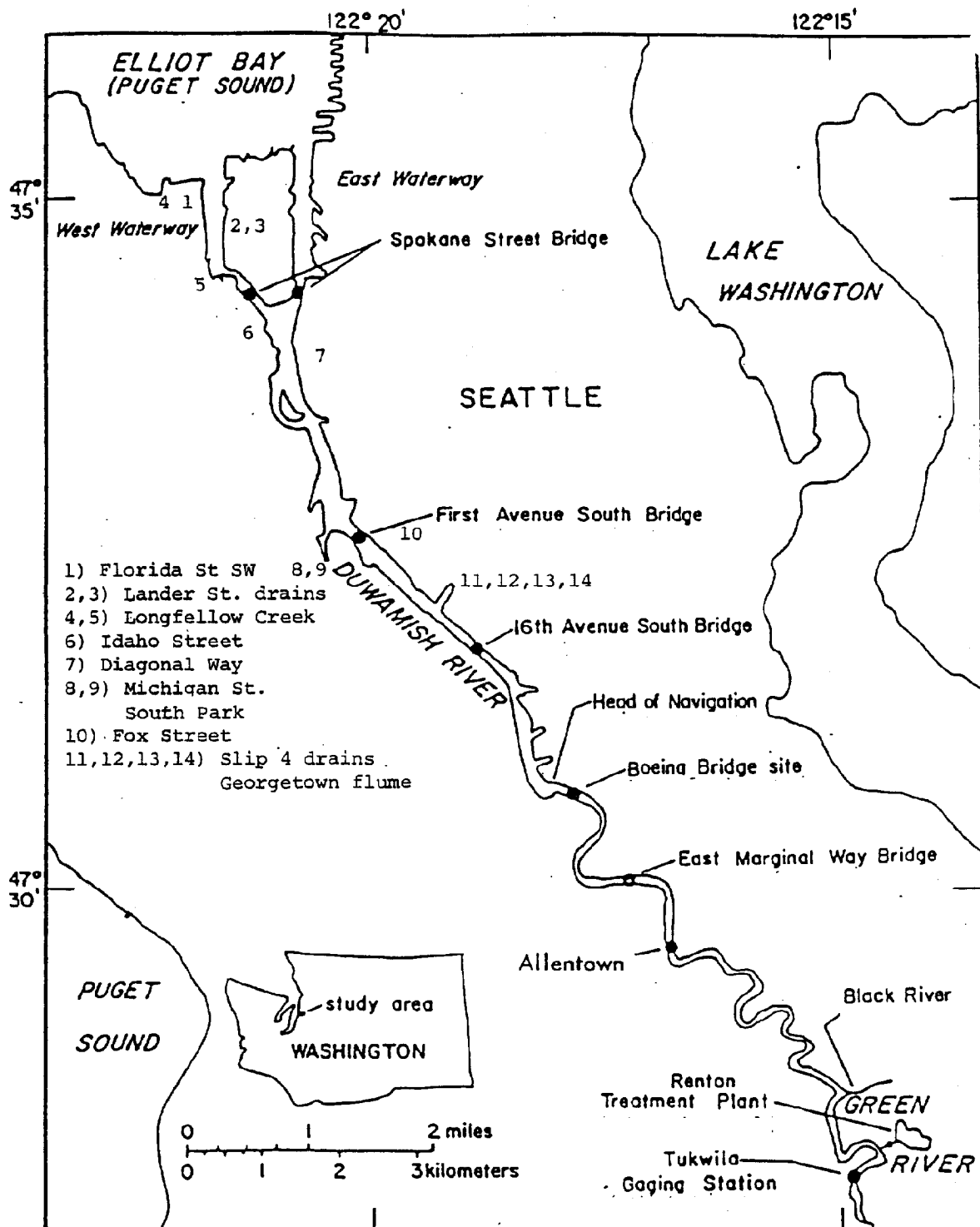
1. The Monitoring Sampling and Analysis Procedures Manual.
2. Detailed analysis of sediment quality data from EPA.
3. Continued trouble call response
4. Groundwater study
5. Duwamish Public Access Plan (Port of Seattle)
6. Duwamish Public Access Plan (city of Seattle)
7. Improved public awareness
8. Data that has been valuable to the Corps of Engineers, EPA Hazardous Waste, Puget Sound Office, and TSCA, DOE Superfund, Port of Seattle and other agencies.
9. Detailed review of environmental documents for water quality impacts.

Continuation of the project is recommended to resolve outstanding issues, complete site visits, ensure implementation of recommendations, finish the groundwater study and sample the smaller storm drainage systems. Progress has been made towards improvement of water and sediment quality of the Duwamish. Further efforts will sustain this progress.

A matrix outlining responsibilities and proposed actions by Metro, other agencies and industry is attached (Appendix H). A letter from John Spencer, Director of Water Pollution Control, Metro, to Ernesta Barnes, Regional Administrator, EPA is included



with recommendations for specific stations to be monitored on an annual basis to document improvements in Duwamish water and sediment quality and to measure the impact of specific actions.



MAJOR DUWAMISH STORM DRAINS SAMPLED BY  
METRO - DUWAMISH INDUSTRIAL NON-POINT SOURCE INVESTIGATION

205(j)

## APPENDIX A

**DUWAMISH INDUSTRIAL NON-POINT SOURCE  
INVESTIGATION  
205(j) WORK PLAN**

Submitted to the Washington Department of Ecology  
by Municipality of Metropolitan Seattle (Metro)  
on May 18, 1983

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DUWAMISH INDUSTRIAL NON-POINT SOURCE INVESTIGATION  
205(j) WORK PLAN

I. Problem Statement

The FY83 State/EPA Agreement (SEA) has identified the Green/Duwamish River as one of the highest priority receiving waters in the state. At its headwaters, the Green River is designated Class AA (Extraordinary), but below the confluence with the Black River in Tukwila, the Green becomes the Duwamish River and water quality decreases to Class B (Good) as it receives treated wastewater from the Renton Sewage Treatment Plant, stormwater runoff, combined sewer overflows (CSO's), non-contact cooling water and other non-point sources of pollution. There is only one major discharger (point source) left in the river, the Renton Treatment Plant. All other permitted discharges are minor and are mostly for non-contact cooling water. Despite the point source controls implemented on the river, there still are significant loadings of toxicants to the Duwamish. A pollutant inventory has been completed ("Water Quality Assessment of the Duwamish Estuary", 1982) and a Duwamish Clean Water Plan has been developed by Metro staff based on the recommendations of the report and is scheduled for Metro Council adoption in June, 1983. The plan identifies actions to improve water quality in order to support the beneficial uses of the river. Toxicants (both heavy metals and organics), low flow (affecting temperature and dissolved oxygen) and sediment (from upstream erosion) presently impair salmonid rearing, migration and fishing, wildlife habitat, commercial navigation and food web

organisms. Specific recommendations of the plan are designed to control and correct the sources of these water quality problems. Some of the toxicants exceed chronic and acute criteria (Ambient Water Quality Criteria, EPA, 1980) and can be found in water column samples, bottom sediments and tissues of Duwamish biota (including salmonids). When compared to Commencement Bay, another heavily polluted waterway in the state, the Duwamish has pollutant loadings several times higher (2-5 times) for most toxicants except for some chlorinated hydrocarbons such as hexachlorobenzene and hexachlorobutadiene.

## II. Background

Over the past 20 years control of industrial and municipal effluent control has substantially improved water quality in the Duwamish. Construction of sewage interceptors along both banks of the river in the 1970's diverted industrial effluent out of the river to the West Point sewage treatment plant. Diversion of the effluent from the Diagonal Way Treatment Plant and the Kent and Auburn lagoons substantially improved dissolved oxygen in the river. NPDES permits by DOE and air pollution controls by PSAPCA over the past ten years have helped to diminish pollution impacts to the Duwamish. Actions by other agencies have also lessened the problems in the river but despite all the improvements, water quality in the Duwamish is not sufficient to support the beneficial uses of the river. Metro has recently completed the report "Water Quality Assessment of the Duwamish Estuary" which describes in detail the parameters which presently limit the beneficial uses and estimates the loadings in the year 2000.

Controls on the manufacture and use of PCB's will cause the PCB concentration in Duwamish sediments and bottomfish to continue to decline. Diversion of the Renton effluent in 1986 will remove ammonia and residual chlorine risks to the migratory fish and will improve dissolved oxygen and heavy metal loadings in the upper estuary. With the removal of the last major discharge (the RTP), the remaining water quality problems are originating from non-point sources.

### III. Geographic Area

This study will focus on specific water quality problems of the Duwamish River (see attached map) which is defined as the water between the confluence of the Green and Black Rivers in Tukwila (river kilometer 20) to Elliott Bay (river kilometer 0) including the West, East and Duwamish waterways. The findings of the Duwamish estuary study indicate that toxicants are not evenly distributed in the river and that sediment concentration peak in localized areas. Elevated concentrations in sediments in the industrialized area around Harbor Island indicate possible nearby sources. Starting with the areas of highest heavy metal and organic toxicant concentrations, Metro will inventory and investigate Duwamish industries to determine whether or not they are contributing significant loadings of toxicants and to develop appropriate control measures to be implemented by the industries.



#### IV. Objectives

The objective of the Duwamish Industrial Inventory and Toxicant Control Investigation would to be determine which industries might be contributors of the toxicants and to develop and implement best management practices/good housekeeping measures to ensure control of these sources to enhance water quality of the Duwamish.

In addition to the systematic survey, Metro will continue to respond to water quality complaints on the Duwamish in conjunction with other agencies. Intermittent sources of toxicants through spills and other means may account for some of the large percentage of toxicants which cannot be attributed to known sources.

#### V. Corrective Actions Necessary

The Duwamish Clean Water Plan is recommending the following corrective actions be taken and we propose to do them as part of this grant:

##### A. Control of Toxic Inputs to the Lower Estuary

A significant finding of the study was that sediment concentrations of several toxic heavy metals and some of the organic toxicants peak in the West Waterway and a few other locations. Most parameters are not evenly distributed throughout the estuary; monitoring data indicates certain locations have elevated concentrations indicating nearby sources. Existing data

are not sufficient to demonstrate which non-point sources contribute significant quantities of any pollutant to the estuary. Further source identification work is necessary to determine what quantities of toxicants are discharged and how they are reaching the Duwamish so that appropriate control measures can be developed and implemented. Intensive monitoring of storm drains and industrial processes is suggested. Industries with facilities adjacent to the Duwamish or nearby should be surveyed to determine how they might be contributing to the pollution problems of the estuary. Metro has formed a site visit team to assist the industries to identify sources and develop best management practices for control. The available information does suggest some activities (especially shipbuilding and lead smelting) might be possible sources of arsenic, copper and lead burdens in the Duwamish. Other industrial activities including asphalt manufacturing, wood treatment, electroplating and petroleum product storage may be sources of PAH's and heavy metals and warrant investigation.

Source identification needs to be followed by design and implementation of control measures. After subtracting the known identifiable sources of pollution to the river, there are still large undocumented sources of heavy metals and organic toxicants. Discharges of the Renton Sewage Treatment Plant, combined sewer overflows, non-contact cooling water, recorded spills and upstream sources account for only half or less of the percentages of loadings (42% of the oil and grease, 21% arsenic, 18% cadmium,

25% copper, 9% lead, 2% PCB, 1% PAH's, and 1% phthalates). Water column samples, sediments (top 2 cm) and tissues residues of fish and invertebrates also indicate current uncontrolled inputs into the river. It is expected that the RTP effluent will be diverted to Puget Sound in 1986 substantially diminishing ammonia, dissolved oxygen and residual chlorine problems in the river. Diversion will also remove a large percentage of the heavy metal loadings in the river segment between Tukwila and the head of navigation. Most of the industries along the Duwamish discharge their wastewater directly to the Metro sanitary sewers. With no other known point discharges, stormwater, groundwater and atmospheric fallout from industrial facilities adjacent to the Duwamish are suspected as being major contributors to the pollutant loadings to the river.

#### B. Industrial Good Housekeeping Measures

The majority of the Duwamish shoreline is developed, and includes a number of industries with activities in close proximity to the waterway. The potential exists for pollutant discharges, either through dumping, spills, or surface water runoff from industrial areas. The storage, handling and disposal of hazardous materials which could be contributing to pollutant loads in the estuary through non-point source inputs should be investigated and appropriate best management practices (BMP's) should be developed for industries. It would be desirable to establish a program aimed at identifying existing or potential problems and to correct these problems through modification of industrial activities or practices. Many Duwamish industries use toxic and

hazardous materials in a wide variety of manufacturing processes and with improper storage, handling and disposal, these chemicals can drain or leach into storm drains or groundwater and reach the river. These sources may be the result of historical as well as ongoing practices, and therefore previous as well as present activities on the site need to be investigated. Development of best management practices/good housekeeping measures for industries would control these inputs thereby improving water quality in the Duwamish.

#### C. Continue Trouble Call Response to Water Quality Problems

Metro, in conjunction with several agencies (EPA, Coast Guard, Washington Departments of Ecology, Fisheries, Game and Natural Resources, King County, City of Seattle and others), operates a trouble call system for responding to water quality complaints in the region's streams, lakes, rivers and Puget Sound. Metro has prepared a Trouble Call Response Manual with guidelines for interagency coordination for monitoring and action to respond to the water quality complaints. Metro will continue its participation in this program which includes the Duwamish area. Trouble call responses can be important in identifying intermittent spills and uncontrolled inputs. Samples of water, sediment and biota (where appropriate) will be collected and analyzed. Follow-up by the responsible agencies is part of the program and is required to insure that sources are identified and corrections are implemented.

## VI. Tasks and Outputs

A. Metro's site visit team (staff from Water Resources, Industrial Waste and Toxicant Control Sections) will conduct an industry-by-industry inventory of major industrial and commercial facilities along the Duwamish to determine possible sources of heavy metals and organic toxicants. Storm drains, fugitive dust, storage, handling, use and disposal procedures would be reviewed to identify toxic and/or hazardous materials. The results will be compiled in a report containing a list of toxic and/or hazardous materials used by Duwamish industries, the volumes of each, storm water drainage systems and discharge points, and correlation of the industrial or commercial facilities with areas of elevated concentration of toxicants in either sediment or water. Output: report on inventory of Duwamish industries. This will prioritize the list of industries to be visited in Task B.

B. Beginning with the areas of elevated toxicant concentrations identified in the Duwamish study's final report, "Water Quality Assessment of the Duwamish Estuary" possible sources of water quality problems in the river can be investigated by site visits. Once sources of copper, arsenic, lead and PCB's have been identified and if clean-up measures are implemented there should be significant declines in the loadings of these toxicants.

Samples from storm drains and groundwater will be collected and analyzed for heavy metals and organic toxicants. Flow patterns in drains and sumps and the fate of the wastewater (either to Metro's sanitary sewers or the Duwamish River) can be determined.

Historical as well as present practices will be investigated. Metro's industrial waste files as well as DOE's NPDES permits will be reviewed prior to the site visits. Design of specific control measures and employee education will be discussed with each industry and an implementation plan agreed upon between the industry and Metro. Output: Ten industrial sites will be visited and site-specific recommendations for appropriate clean-up and pollutant control measures will be developed for each industrial site. With control of industrial non-point sources, the water quality of the Duwamish can be substantially improved.

C. Metro will continue its participation in the trouble call system to respond to intermittent spills, fish kills or water quality problems on the Duwamish. Output: Continued trouble call response as needed. Monthly summaries will be prepared and provided to DOE. Control of periodic spills and response of appropriate agencies may substantially reduce the non-point inputs to the river and lower the percentages of pollutants which cannot be ascribed to known sources.

#### VII. Expected Results

The goal is to work with the industries to identify sources of toxicants and to control them before they reach the river.

With improved water quality, the Duwamish should be better able to support its beneficial uses of salmonid rearing, migration and fishing, wildlife habitat; supporting food web organisms and boating as well as commercial navigation.

boating as well as commercial navigation.

# BUDGET BY TASK

	Task 1	Task 2	Task 3	Total
Salaries	\$4,512	\$18,048	\$4,512	\$27,072
Benefits	1,579	6,317	1,579	9,475
Materials and Supplies		500	500	1,000
Samples and Analysis		30,000	4,400	34,400
TOTAL	\$6,091	\$54,865	\$10,991	\$71,947

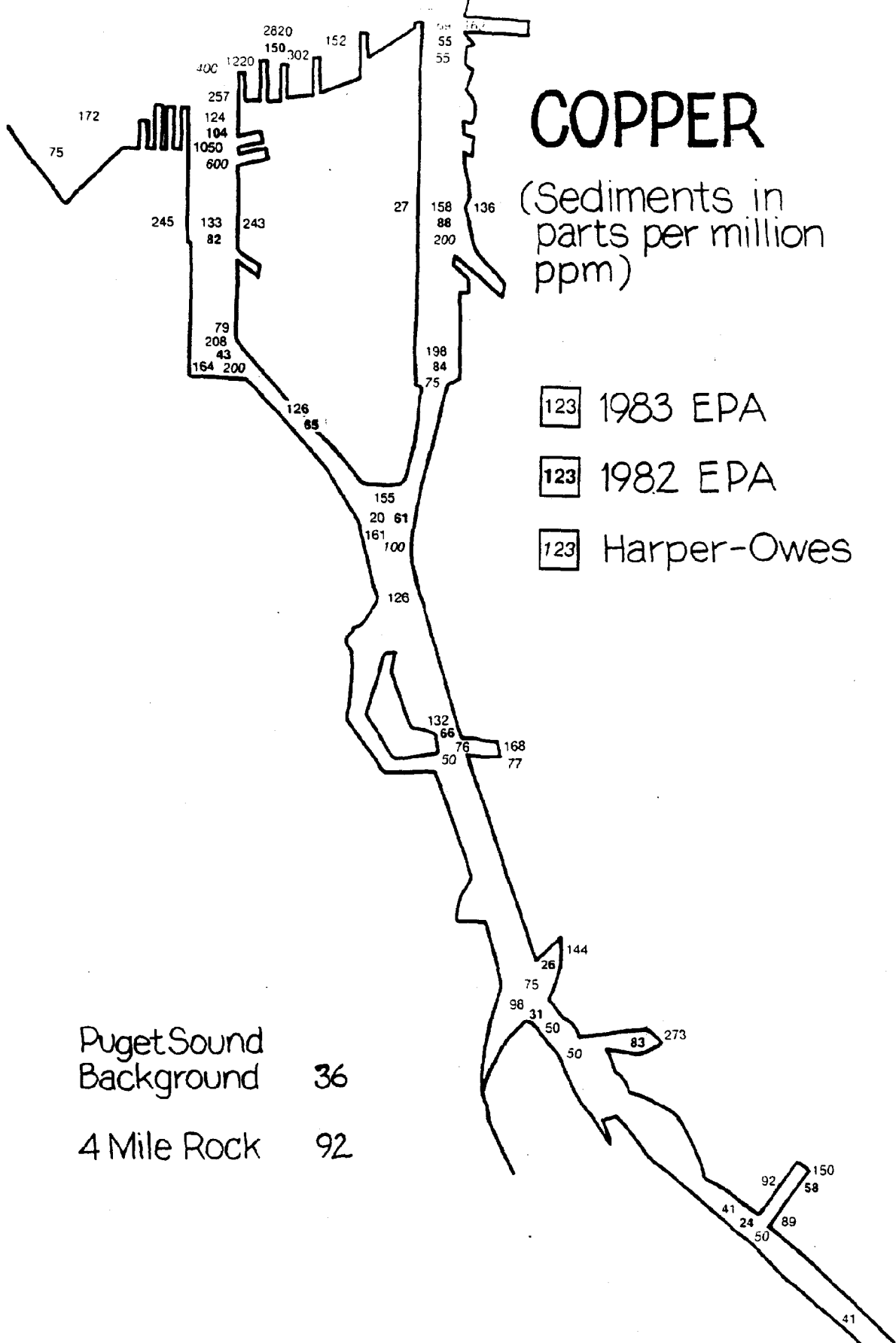
# BUDGET BY QUARTER

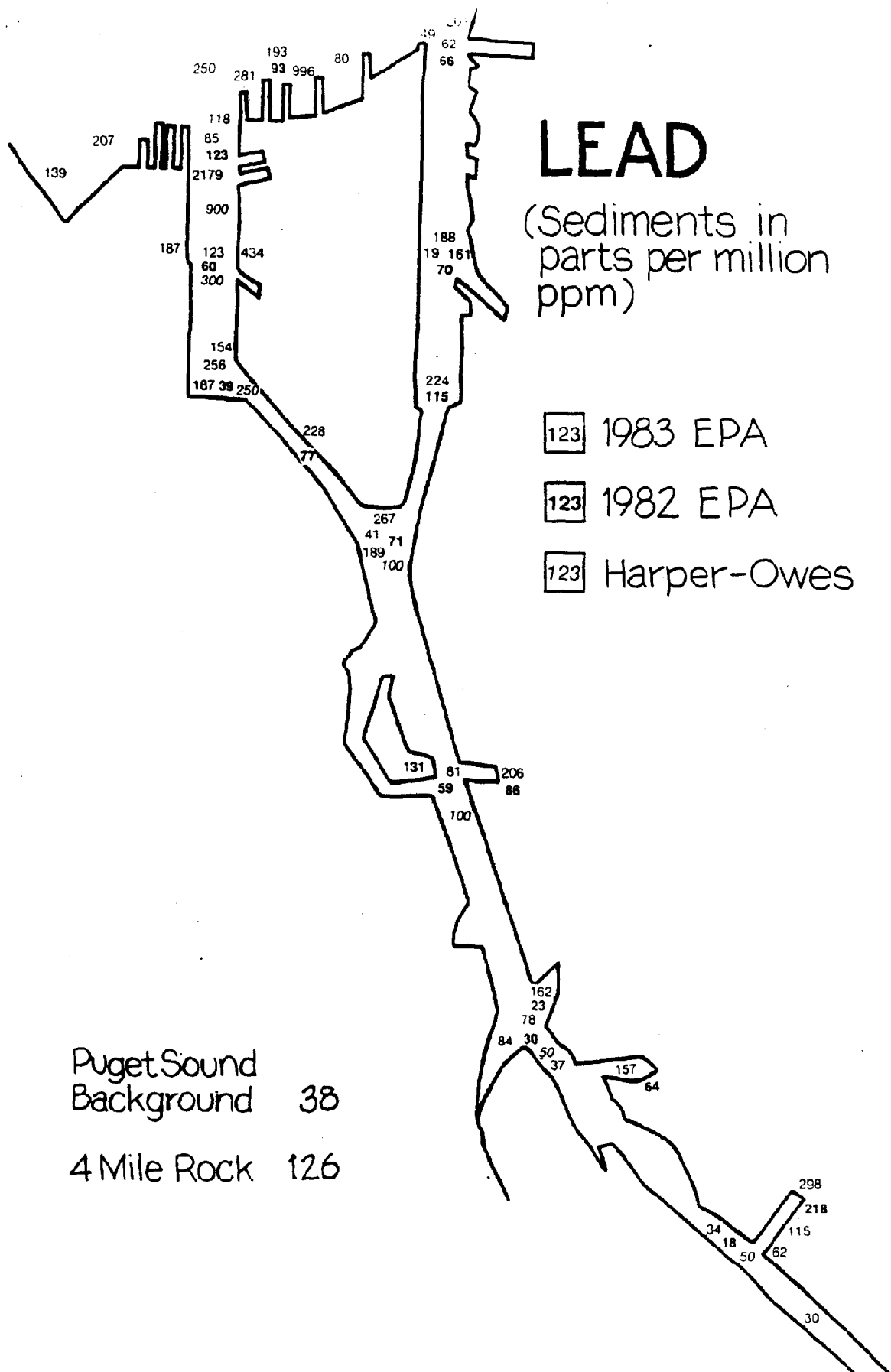
	1st	2nd	3rd	4th	Total
Salaries	\$6,768	\$6,768	\$6,768	\$6,768	\$27,072
Benefits	2,369	2,369	2,369	2,369	9,475
Materials and Supplies		500	500		1,000
Samples and Analysis		11,467	11,467	11,467	34,400
TOTAL	\$9,137	\$21,104	\$21,104	\$20,604	\$71,947

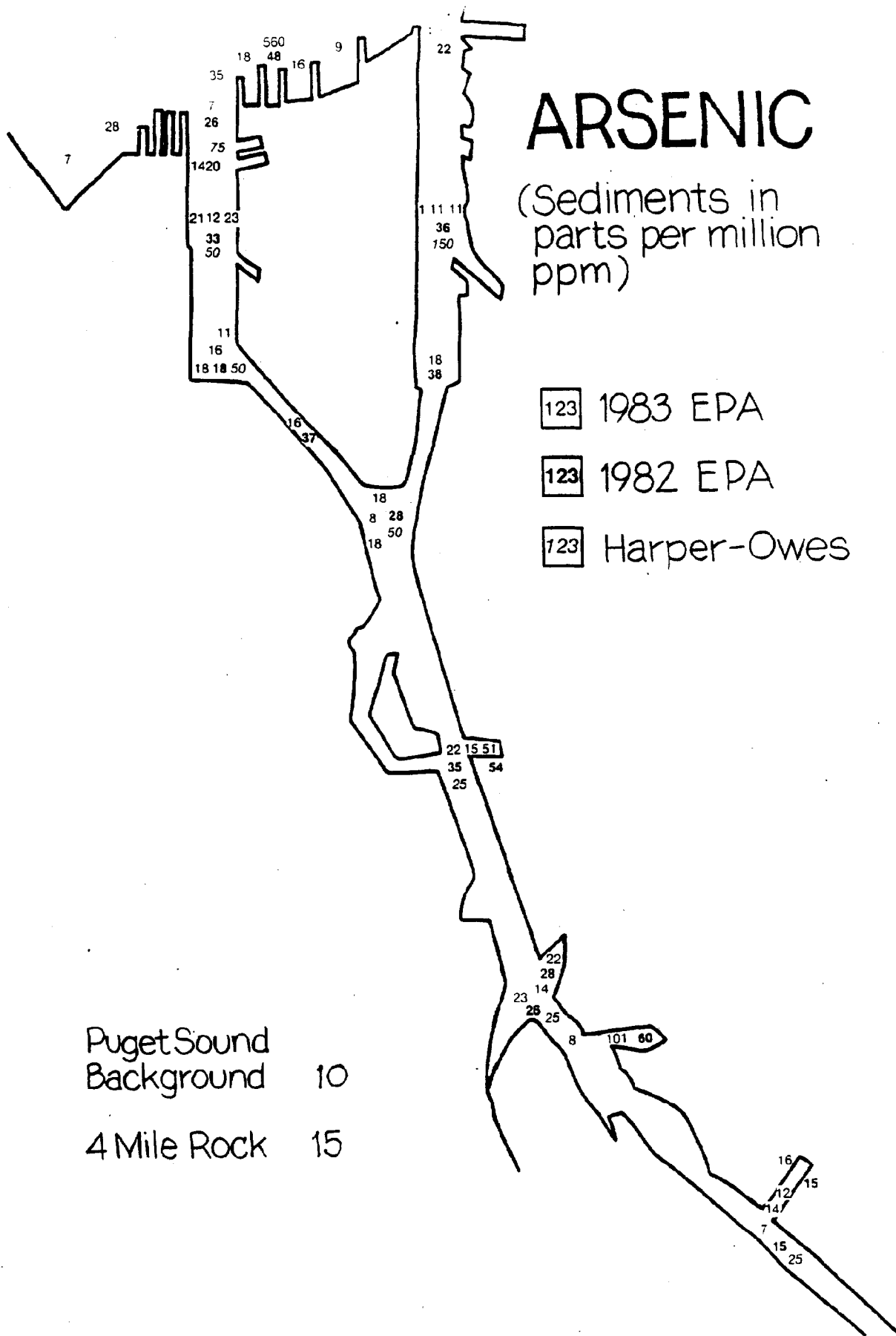
METRO	\$17,987
DOE	\$53,960

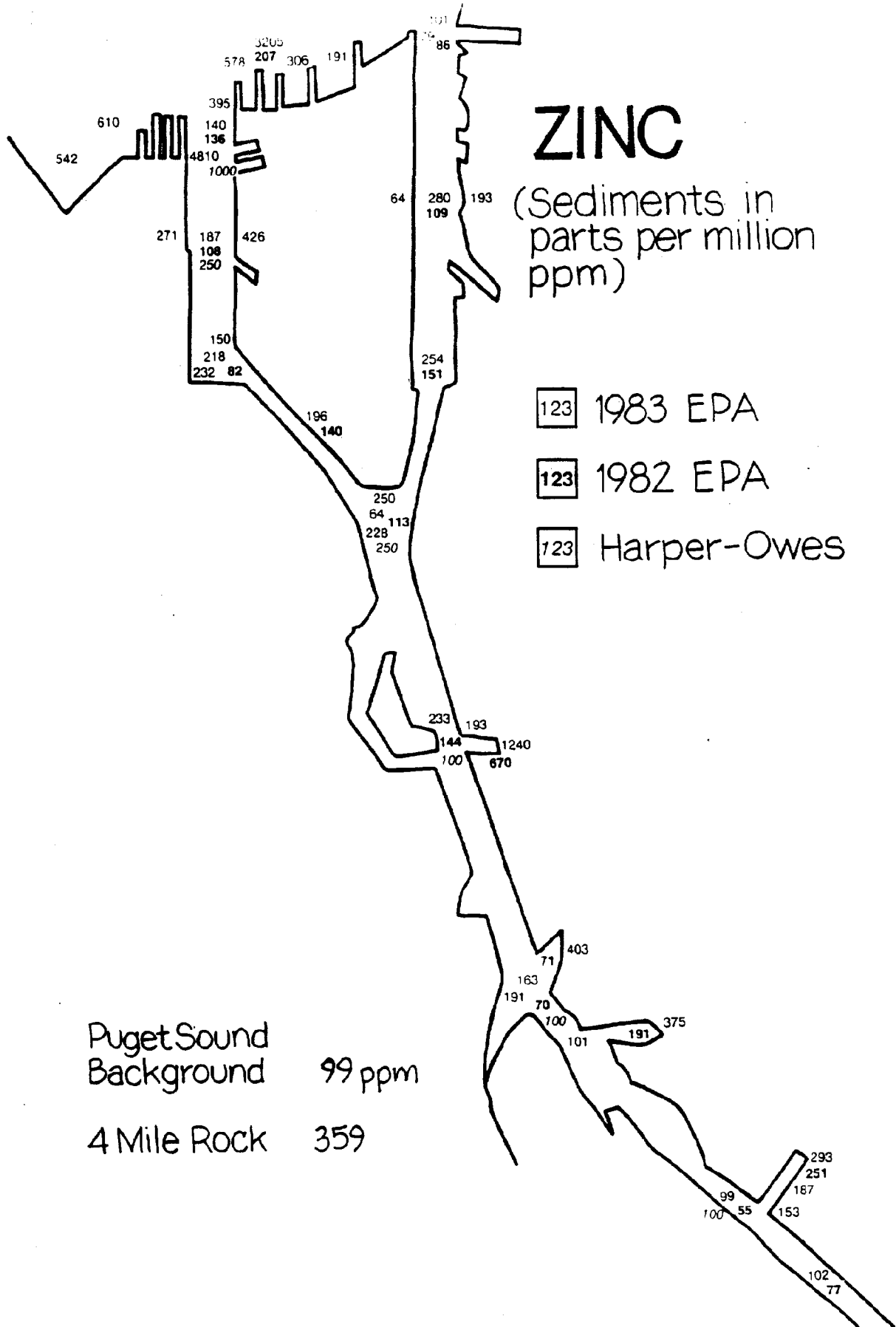


APPENDIX B

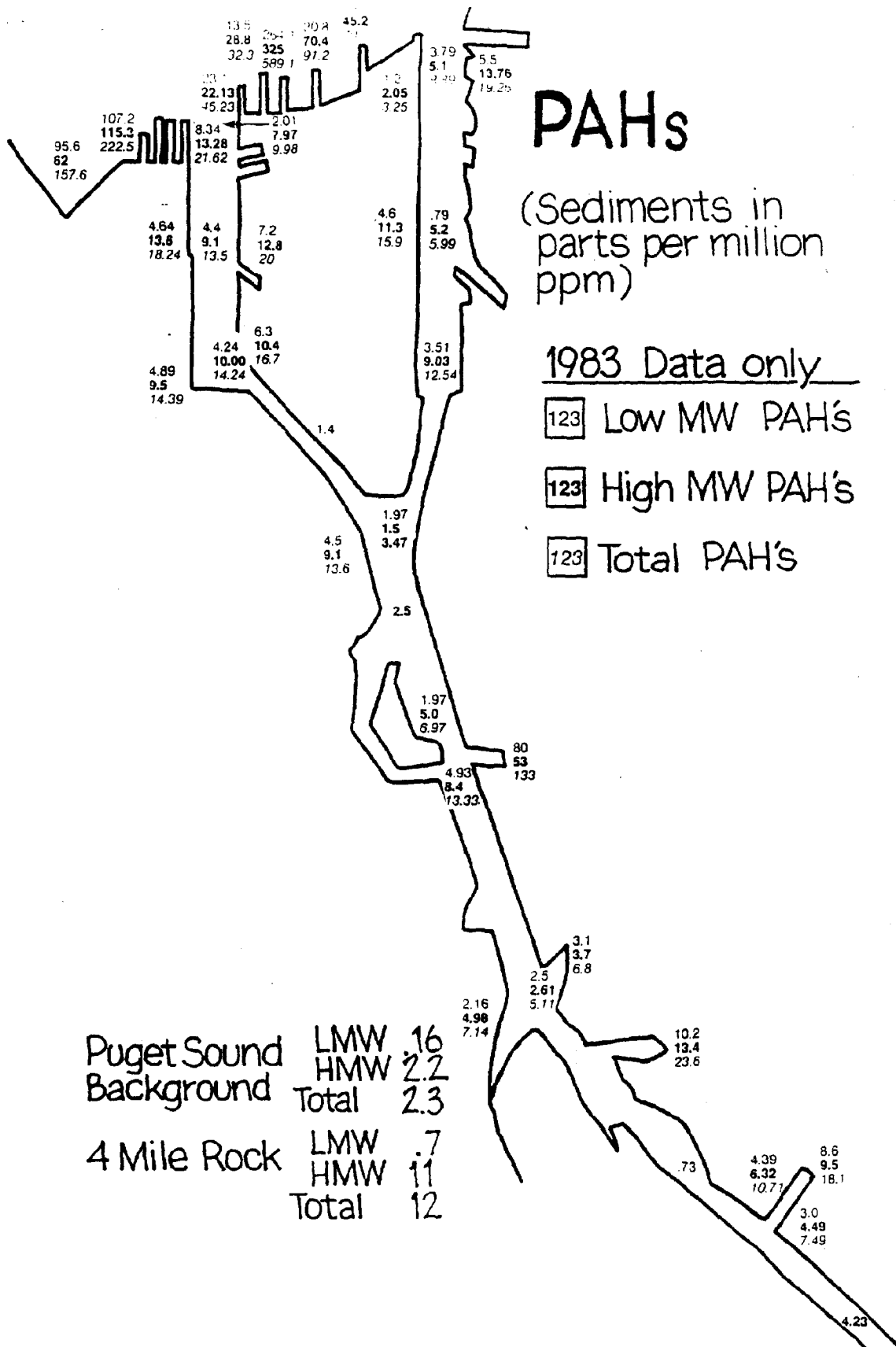
















APPENDIX C

GUIDELINES FOR METRO SITE VISIT AND DUWAMISH ACTION PLAN

PHASE I

Site Visit/Evaluation/Problem Definition

Prior to a site visit the following information will be supplied by METRO:

- The composition of the site team including a professional profile and area of expertise.
- The agreed upon goal of METRO, DOE and EPA as to specific water quality standards to be achieved in the receiving waters to which the industry is tributary.
- The expected level of responsibility of industry in the overall program.

Concurrent with initiation of the site visit effort, METRO will, in cooperation with DOE and EPA, provide interested industries with a workshop or training sessions to assure that water quality monitoring and sampling programs performed by industries or consultants are standardized as to collection and analysis techniques.

The procedure for an on-site visit shall be as follows:

- Step 1. Pre-visit conference (at METRO) -- This is for the purpose of reviewing and exchanging all available pertinent information pertaining to the site. This may include information in METRO files, information obtained from other agencies and information supplied by the company, including site plans, maps and other pertinent data. At this time any additional information or clarification of misinformation may be noted by either METRO or the company. Limitations as to the scope of the visit due to proprietary or federal security requirements will be discussed and agreed upon at this time. A date for the visit will be established. METRO will assure that all members of the site team are available for this conference.

Step 2. Site visit -- A visit of the physical site with no sampling conducted at this time. At the conclusion of the tour the participants will hold a preliminary summary conference at which time the site team will convey any questions or concerns which may need further research and/or evaluation by the company. A date for the post-visit conference will be established.

Step 3. Post visit conference (at METRO) -- This conference is for the purpose of informally discussing the team's findings and proposals for further evaluation of the site, if necessary. The company will provide additional clarification to issues and concerns brought up at the preliminary summary conference. This may conclude the on-site process or, if necessary, METRO will outline suggestions for sampling and/or control measures. If further evaluation is indicated a date for company response will be established.

This concludes the uniform procedure for all on-site visits. The need for the following steps will be determined as a result of the above procedure and will, undoubtedly, vary from site-to-site and company-to-company.

Step 4. The company, upon review of the suggestions by METRO, and any further data which may be developed, will submit a letter to METRO describing its proposed participation in this cooperative effort, including a proposed schedule for initial sampling and/or near-term control measure implementation. Should requirements regarding METRO's possession of confidential or proprietary information be necessary, such agreements will be confirmed in writing.

Step 5. Upon METRO's review of the above, the agency will request a conference to discuss the proposed sampling and/or near-term control schedule and to identify any areas of misunderstanding or disagreement. METRO and the company will also reach agreement on cost sharing of sampling. This will be formalized in contract form.

## PHASE II

### Design of Implementation Programs

Upon completion of Phase I for as many as is feasible, but at least a majority of industries within a specified zone (see attached) Phase II will commence.

Step 6. METRO will analyze the results of the sampling program jointly established and implemented in Phase I and develop a profile of the contaminant loading in the river or portion of the river under study.

Step 7. Based upon this profile (as well as previous documentation of contaminant loading), METRO will meet with the industry to outline the findings and any proposals for additional, long-term control measures. It is understood that no action is anticipated on these long-term measures until the costs to industry and benefits to the river have been identified.

## PHASE III

### Negotiation and Implementation of Controls/Continued Monitoring

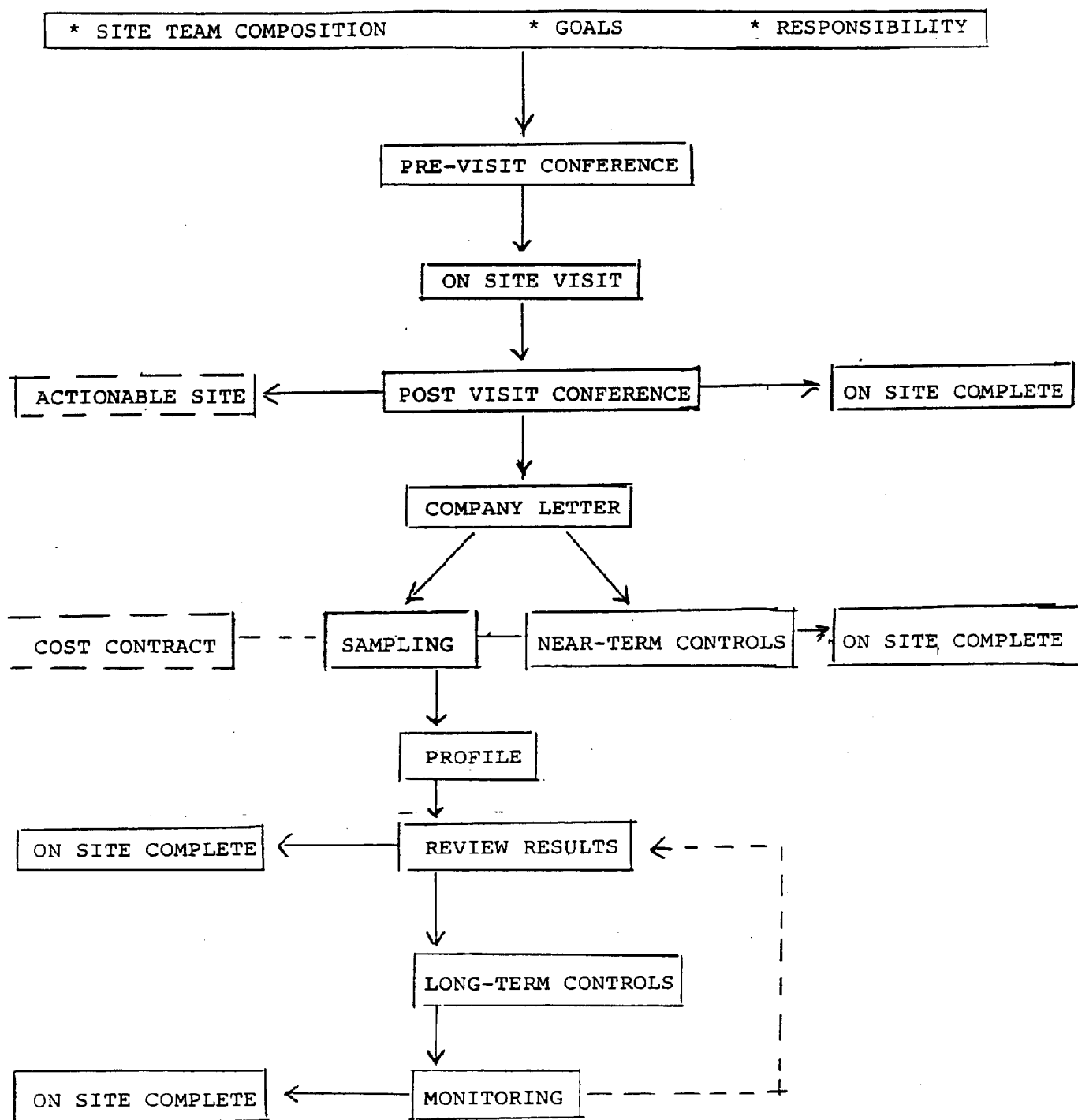
The controls established in Phase III will be based on Phase II. The profile developed by METRO will be considered, along with such factors as cost to industry, benefit to the water quality of the river, and the anticipated level of improvement. In all cases, the most cost-effective methods of control will be given highest priority.

Step 8. Upon industry review of METRO's proposals it will submit a letter describing its proposed participation including a schedule of implementation.

Step 9. Upon METRO's review of the above, the agency will request a conference to discuss the proposed implementation program and to identify and negotiate any areas of misunderstanding or disagreement.

Step 10. Upon completion of the agreed upon control measures a joint monitoring program will be initiated to provide follow up reports on river improvements resulting from this cooperative effort.

METRO will inform each applicable company of any distribution of written materials generated as a result of Phases I, II, and III. above.



## APPENDIX D



**Municipality of Metropolitan Seattle**

**Exchange Bldg. • 821 Second Ave., Seattle, Washington 98104**

February 1, 1984

MEMORANDUM

TO: Chuck Carelli, Washington Department of Ecology

FROM: Tom Hubbard, Water Resources Section

SUBJECT: Selection Criteria for Site Visits

Because of the large number of industrial and commercial facilities which possibly could be sources of toxicants to the river, selection criteria were established in order to set priorities for site visits. The goal of the Metro 205(j) funded study is to identify sources of heavy metals and toxic organic pollutants originating from industrial non-point sources adjacent or tributary to the Duwamish River and develop appropriate control measures to be implemented by the industries. In establishing the initial on-site visits the following parameters were taken into consideration:

1. Industry location relative to areas of the river with elevated concentrations of metals or organics in either the water column, sediment or biota.
2. Correlation of the industrial activity and materials handled on the site to the parameters of concern to the river.
3. Proximity to the river.
4. Size of the facility.
5. NPDES permits
6. Metro's Industrial Waste files
7. Previous trouble calls
8. History of the site
9. Other information if available
10. Willingness of industry to cooperate

A major finding of the "Water Quality Assessment of the Duwamish Estuary" (Metro, 1983) is that toxicants are not evenly distributed in the river and that sediment concentrations of heavy metals and organic pollutants peak in certain areas, particularly around Harbor Island, in the West Waterway and in the blind slips along the Duwamish. Recent intensive monitoring cruises by EPA corroborate the earlier findings. The data suggests that the site visits should focus on in-

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Memo to Chuck Carelli, WDOE  
Page Two  
February 1, 1984

industries at the mouth of the river on Harbor Island, along the West Waterway and near the blind slips 1, 3, and 4.

The monitoring data also indicates that different toxicants are found in different areas. Heavy metals peak in the West Waterway at the mouth with the exception of lead which is associated with the Lander Street storm drain. PCBs are found in other areas. By correlating industrial activities such as electroplating, ship repair and construction, electrical transformers, lead smelting, machine shops, etc. with the areas of elevated concentrations, the industrial facilities were selected for site visits.

Industries located directly adjacent to the Duwamish have a greater possibility of directly impacting the river through non-point sources such as accidental spills, fugitive dust, storm water runoff or groundwater contamination. Industrial or commercial facilities inland, however, can have a major impact (e.g., the lead smelter's fugitive dust from the center of Harbor Island may be a major source of lead to the Duwamish).

The size of the facility was also important for selection of site visits. Although a small machine shop could be a large source of toxicants, a larger one has the potential of a wider diversity of processes, employing more workers and storing more materials on site.

NPDES permits administered by WDOE provided important information regarding industrial processes, the volume and quality of effluent produced and discharged by the facility. NPDES inspection reports sometimes mention non-point source problems. An industry's NPDES permit is reviewed prior to its selection for a site visit.

Similar to the NPDES files, Metro's Industrial Waste files often provide relevant information regarding possible non-point source problems.

Previous trouble calls received by WDOE, Metro and others indicate potential non-point source discharges especially from accidental spills.

The history of a particular site was also an important consideration for selection. Although this information is often unavailable, sites such as Terminal 5, which presently appear innocuous, could have been dump sites in the past.

Using the criteria listed above, the sites for Metro visits under the Duwamish Industrial Non-Point Source Investigation were selected and priorities established.

TH:bb

## APPENDIX E



Municipality of Metropolitan Seattle

Exchange Bldg. • 821 Second Ave., Seattle, Washington 98104

February 1, 1984

MEMORANDUM

TO: Chuck Carelli, Washington Department of Ecology.

FROM: Tom Hubbard, Water Resources Section

SUBJECT: Zone 1 Industrial Inventory

The major activities of the industries in Zone 1 (Spokane Street Bridge to the mouth of the Duwamish) are listed below:

Al Bolser Tire Service  
3408 13th SW  
Retail/wholesale warehouse  
tires

Asahipen America, Inc.  
1128 SW Spokane Street  
Paint manufacturer

Atlantic Richfield  
1652 SW Lander  
Petroleum storage and  
transfer

Barco Wiper Supply Company  
2938 16th SW  
Industrial wipers, rags -  
clean/cut/bail

Bethlehem Steel Corp.  
4045 Delridge Way SW  
Iron and steel manufac-  
turers

Clean Sound Corporation  
2406 13th SW  
Oil spill control and  
clean up

Columbia Cement Corp.  
3423 Klickitat SW  
Cement storage and  
transfer

Crowley Maritime Corporation  
Fourth & Battery Building  
Tugboat

Duwamish Waterway Association Marina  
1317 SW Spokane  
Pleasure boat marina association

ESCO NW Industrial Service Center  
1131 SW Hanford  
Stainless steel/fittings - retail/  
wholesale outlet

Fishers Mills, Inc.  
3235 16th SW  
Food processing

Freight Management Associated  
P.O. Box 3537  
Barge/tows - Seattle/Alaska

Global Diving and Salvage  
2763 13th SW  
Shipyard diving/inspection

Harbor Island Machine Works, Inc.  
3431 11th SW  
Metal parts fabrication

Hardware Specialty Company  
3419 11th SW  
Wholesale/marine electrical supply

Memo to Chuck Carelli, WDOE  
Zone 1 Industrial Inventory  
Page Two  
February 1, 1984

Kipper and Sons Fabricators, Inc.  
3215 13th SW  
Boilers

Leckenby Company  
2745 11th SW  
Metal fabricators

Lockheed Shipbuilding and  
Construction Company  
2929 16th SW  
Ship repair and construction

Lone Star Industries, Inc.  
P.O. Box 1020  
Cement manufacturer

Meltec (A Div. of Young  
Corporation)  
3444 13th SW  
Steel foundry

Mobil Oil Corporation  
1711 13th SW  
Petroleum product storage  
and transfer

Non Ferrous Metals, Inc.  
2905 13th SW  
Scrapyard metal recycling

North Star Forwarding Company  
1830 13th SW  
Alaska/barge - container and  
rail cars

Owens Corning  
1141 SW Hanford  
Contractor/marine division  
(insulation)

Pacific Molasses Company  
3200 11th SW  
Wholesale molasses (not for  
human consumption)

Pacific Rendering Company, Inc.  
2926 16th Avenue SW  
Butcher shop scraps

Pacific Wire Works  
2743 13th SW  
Fabricators of wire -  
stainless steel/steel

Pilgrim Pet Supply  
1122 SW Spokane  
Wholesale pet supply warehouse

Port of Seattle  
P.O. Box 1209  
Container terminals

RSR Corporation  
2700 16th SW  
Lead smelter/battery recycling

Seattle Iron and Metals Corporation  
2955 11th SW  
Scrap yard/metal recycling/

Seattle Stevedore Company  
3415 11th SW  
Office for longshoremen

Shell Oil Company  
2720 13th SW  
Petroleum product storage and transfer

Texaco, Inc.  
2555 13th SW  
Petroleum product storage and transfer

Memo to Chuck Carelli, WDOE  
Zone 1 Industrial Inventory  
Page Three  
February 1, 1984

Todd Shipyards Corporation  
1801 16th SW  
Ship repair and construction

Value Metal Polishing & Plating  
3207 11th SW  
Metal finishing and electroplating

WIOMC - Washington Industrial Clinic  
3400 13th SW  
Industrial medical office

Wyatt Engineers  
3214 16th SW  
Engineering offices and warehouse

TH:bb

## APPENDIX F

<u>INDUSTRY</u>	<u>ON-SITE</u>	<u>FOLLOW-UP/COMMENT</u>
1. RSR/Bergsoe Metal	1/11/83	Monitoring in Lander Street storm drainage system 2/27/84 Clean out 10/24/84
*2. Lockheed Marine	5/2/83	Scope of Work for Monitoring 5/26/83 Post site conference 3/13/84 Letter describing control measures implemented 4/6/84
*3. Marine Power & Equipment	9/14/83	Letter requesting additional information 10/27/83 Post site visit conference 3/7/84 Response 4/13/84 Referred to DOE 5/3/84 Fined \$5,000 by DOE 7/26/84. Appealed to WPCHB
*4. Jorgensen Steel	10/24/83	NPDES permit and acid pit referred to DOE 11/1/83 Jorgensen response to DOE Hazardous Waste 3/20/84
5. Leckenby	11/9/83	Recommendations that drum storage area be bermed. Facility now closed.
6. Harbor Island Machine Works	11/10/83	Recommendations that oil absorbent pads be available near storm sewer sump. Problem resolved as per letter of 10/10/84
7. Columbia Cement	11/10/83	No additional control measures necessary Letter 11/23/83 Trouble call 10/24/84. Recommended berming wash area 10/25/84
8. Shell Oil	11/15/83	Letter requesting groundwater information 1/24/84
9. ARCO	12/16/83	Request for groundwater information one sample below--scheduled stormwater discharge to river
*10. Todd Shipyards	1/12/84	Post site visit conference 3/6/84 Response letter 4/6/84 Referred to DOE 4/17/84
11. Seattle Iron & Metal	2/8/84	Samples taken 2/29/84 Post site conference 4/16/84 Additional samples 4/27/84 Letter with results, recommendations 10/24/84 Work continuing with Industrial Waste Division

<u>INDUSTRY</u>	<u>ON-SITE</u>	<u>FOLLOW-UP COMMENT</u>
12. Pacific Rendering	2/8/84	No additional control measures necessary
13. Chevron	2/22/84	Request for groundwater data 4/23/84
14. Mobil	3/20/84	No additional control measures necessary
15. Asahipen Paint	3/20/84	No additional control measures necessary
16. Pacific Wire Works	6/20/84	No additional control measures necessary
17. Texaco	6/26/84	Recommendation that trucks be washed in appropriate facility; Requested Groundwater information. Resolved letter of 9/10/84.
18. Non Ferrous Metals	6/21/84	Drain sample taken 7/13/84. Recommendation letter 10/24/84
19. Kipper & Son Fabricators	6/18/84	No additional control measures necessary
20. Meltec	7/19/84	Two samples requested - scheduled
21. Al Bolser Tire Service	unnecessary	Wholesale/Retail Outlet
22. Barco Wiper Supply	unnecessary	(checked I.W)
23. Clean Sound Corp.	unnecessary	Oil spill control. Cleanup occurs off site
24. Duwamish Water Association Marina	unnecessary	Pleasure boat marina
25. ESCO NW Industrial	unnecessary	Wholesale/retail outlet-stainless steel fitting
26. Fisher Mills Inc.	9/7/84	No additional control measures necessary
27. Freight Management Assn.	unnecessary	Barge/tows-Sea/Alaska
28. Global Diving & Salvage	unnecessary	Office & equipment storage
29. Hardware Specialty Co.	unnecessary	Wholesale/marine electrical supply



<u>INDUSTRY</u>	<u>ON-SITE</u>	<u>FOLLOW-UP/COMMENT</u>
30. North Star Forwarding	unnecessary	Container operation
31. Owens Corning	unnecessary	Insulation contractor/marine division
32. Pacific Molasses	7/23/84	Recommendation that emergency shut-off valve be installed
33. Pilgrim Pet Supply	unnecessary	Wholesale/warehouse
34. Seattle Stevedore	unnecessary	office
35. Value Metal Polishing	unnecessary	Metro I.W. (Denise Healey) DOE lead
36. WIOMC	unnecessary	Industrial medical offices
37. Wyatt Engineers	unnecessary	Engineering offices and warehouse
38. Wycoff	unnecessary	EPA/DOE lead. Storm drain samples 4/5/84
39. Long Painting	8/17/84	No additional control measures necessary
40. Malarkey Asphalt	8/21/84	Samples taken of pone 10/22/84, river bank sediment 10/23/84
41. Richardson & Holland	8/22/84	No additional control measures necessary
42. Purdy Company	9/17/84	Recommended recycling used oil, avoid transformers with PCB's
43. Ideal Basic Industries	10/10/84	Presite 9/26; letter of 10/22, No additional control measures necessary
*44. Monsanto	10/2/84	Presite 9/14; Telephone post site 10/10; Letter 10/18/84, No additional control measures necessary
*45. Kenworth	10/2/84	Presite 9/19; Telephone post site 10/10; Letter 10/23 No additional control measures necessary
*46. Northwest Glass	10/2/84	Presite 9/14; Telephone post site, 10/26. Recommended burm, cover of oil drum storage area. Resolved, letter of 11/6/84. No additional control measures necessary.

<u>INDUSTRY</u>	<u>ON-SITE</u>	<u>FOLLOW-UP COMMENT</u>
47. GTAX Terminals	10/12/84	No additional control measures necessary
*48. Ashgrove Cement	10/10/84	Presite 10/10 Post-site 11/29. Recommended paving berm and cover oil storage area. Requested samples of slag fly ash, coal and surge pond.
*49. Manson Construction	11/14/84	Presite 11/9
*50. Duwamish Shipyard	11/28/84	Presite 11/15 Post-site 12/6

\*Member, Duwamish Industrial Council.

## APPENDIX G

## CONSULTANT SCOPE OF WORK FOR DUWAMISH GROUNDWATER STUDIES

Metro is continuing its efforts to identify potential non-point sources of toxicants to the Duwamish through site visits to industrial facilities, storm drain monitoring and reviewing all current water quality data from the Duwamish. These programs will address the contributions of stormwater, fugitive dust and accidental spills, however the role of groundwater in the pollution problems of the lower Duwamish is poorly understood. Large percentages of the loadings of toxicants cannot be attributed to known sources. Groundwater discharges from current or historical sources may contribute heavy metals and organic toxicants to the river. Limited information is available from a few sites, but a comprehensive understanding of groundwater quality, quantity and dynamics is lacking.

Metro is specifically interested in the impact of groundwater on the Duwamish River from the mouth of the Black River (River mile 11.0) to the mouth of the East and West Waterway.

To our knowledge, at least eight groundwater studies at specific locations have been undertaken in the area. ChemPro analyzed organic solvents migrating from its facility. Boeing and Isaacson Steel investigated possible sources of arsenic in groundwater near the old Slip 5. Several tank farms (Chevron, Arco and Shell) studied groundwater contamination from petroleum

product spills on their facilities. The RSR lead smelter on Harbor Island discharged its wastewater to a land-bottomed lagoon. At least one monitoring well has been dug on site. Groundwater studies were undertaken as part of the preliminary engineering for the West Seattle bridge. As part of the predesign for Metro's Renton effluent transfer system pipeline, groundwater along the west bank of the Duwamish will be studied. Undoubtedly, there are additional groundwater investigations in the area as part of EPA RCRA studies and other monitoring efforts; however these individual studies have never been synthesized into a comprehensive analysis of groundwater in the lower Duwamish.

Large gaps exist in information regarding quality, quantity, and dynamics of groundwater in the Duwamish and its relative contribution to the loadings to the river. Metro is seeking a consultant to develop a thorough groundwater strategy for the Duwamish. Historical information regarding industrial practices in the area will be reviewed, existing monitoring information will be analyzed and recommendations for well placement, depth, parametric coverage and an estimated budget for the monitoring program will be developed.

#### **Consultant Tasks**

1. Review historical information on waste disposal practices in the lower Duwamish. EPA has aerial photographs of the area since the 1940s and has identified locations with possible problems.

As part of its Duwamish Industrial Non-Point Source Investigations, Metro has researched historical information on industrial practices and possible areas of groundwater contamination. Other information on location of potential problem areas will also be reviewed. Metro will provide the consultant with EPA aerial photographs and historical information obtained through industrial non-point source investigations. Consultant will be responsible for researching additional information from EPA, DOE and others.

#### Output

Written report describing historical practices and locations of concern will be prepared.

2. Consultant will review the history of fill operations of the lower Duwamish from the Head of Navigation (River mile 6) to the mouth of the river including the construction of Harbor Island and the channelization of the river. Human developments on the lower river may have altered groundwater dynamics and quality.

#### Output

Written report compiling a history of dredging, fill and channelization activities in the lower Duwamish and an analysis of their effect on groundwater dynamics and quality.

3. Review and analyze existing groundwater data. At least eight groundwater studies have been undertaken. The results of these

and others should be synthesized into a report describing what is presently known about groundwater quality, quantity, dynamics, and sources of contamination in the lower Duwamish. Metro will provide consultant with results of groundwater studied at ChemPro, Boeing/Isaacson Steel, Chevron, West Seattle Bridge and Terminal 105, and Renton Effluent Transfer System. Consultant will obtain groundwater studies from Shell and Arco and other industries if available. Consultant will research any additional groundwater studies available for EPA (RCRA and other programs), DOE and other agencies, and other industries.

#### Output

Written report summarizing existing knowledge of Duwamish basin groundwater and identifying data gaps.

4. Based on Tasks 1, 2 and 3 develop a detailed groundwater monitoring and analyses strategy to fill the data gaps with recommendations for number sampling stations (wells, bank seepages, etc.) and their placement, parametric coverage, estimated cost and budget. The study will determine if groundwater is contributing to the pollution problems to the Duwamish. There will be alternatives for the proposed monitoring program requiring well placement on public rights-of-way or placement on private land if permission is granted or a combination of both.

## Output

Three detailed monitoring strategies with different levels of effort to determine the relationship, if any, between groundwater and pollution of the Duwamish River. The study proposal will include budget, number and location of sampling stations and parametric coverage. The proposals should include the questions expected to be answered and a clear identification of the management decisions which can be made from each alternative.

5. Consultant will be available to defend the results of the analysis and the-proposed scope of work which will be presented to the Duwamish Industrial Council, community groups and others.

## Consultant Selection Criteria

- |  |           |
|--|-----------|
| 1. Previous experience and ability to evaluate industrial waste disposal practices and impact on groundwater.  | 35 Points |
| 2. Knowledge of groundwater quality, quantity and dynamics of the Duwamish.  | 30 Points |
| 3. Demonstrated ability to synthesize existing data into comprehensive program and experience necessary to develop a groundwater monitoring strategy and budget. | 35 Points |

6/27/84



APPENDIX H

	METRO	DOE	EPA & PS Office	COE POS	NOAA NMFS	SEA-KC HEALTH DEPT.	INDUSTRY
WATER	Continue monthly river samples @ three locations			Sampling as part of widen- ing and deepen- ing	Continue river dynamics studies @ PMEL		
SEDIMENT	In river samples as part of site visit & storm drain studies		Continue annual sampling @ 42 sta- tions & six addi- tional in conjunction with PS/ Elliott Bay	Intensive sampling & coring as part of W&D CP&E	Continue river dynamic studies @ PMEL		
BIOLOGICAL STUDIES					Annually monitor fish for abnormali- ties & sedi- ment bio- assays	Determine human health aspects of consumption of bottom- fish	

	METRO	DOE	EPA & PS Office	COE POS	NOAA NMFS	SEA-KC HEALTH DEPT.	INDUSTRY
STORM DRAINS	Continue source tracing & clean up efforts in storm drains	Continue fund- ing of Metro through 205(j)	Sampling of above river sediment				Participate in clean-up actions
INDUSTRIAL SITE VISITS	Continue site visits & sampling follow up to ensure implementa- tion	Resolve sand blast issues & follow up on trouble calls hazardous waste & en- forcement if necessary					Continue parti- cipation in site visits and imple- ment recommenda- tions
GROUND- WATER	Ground- water study by Sweet- Edwards result- ing in GW strat- egy	Review report	Review report				Participate in study by provid- ing data of pre- vious studies and review report

TPH:bb  
11/14/84

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Municipality of Metropolitan Seattle

Exchange Bldg. • 821 Second Ave., Seattle, Washington 98104

November 30, 1984

Ms. Ernesta Barnes, Administrator  
Environmental Protection Agency  
Region X  
1200 Sixth Avenue  
Seattle, Washington 98101

Dear Ms. Barnes:

Metro would like to take this opportunity to comment on a recent letter to you from Seattle Mayor Charles Royer detailing actions taken on Harbor Island lead contamination and suggesting that the site be either removed from the Superfund list or that your agency delineate what further steps need to be taken.

As you may be aware, Metro has been actively involved in Duwamish clean-up efforts since our Council adopted the Duwamish Clean Water Plan in June 1983. As part of that effort we assisted in coordinating the clean-up effort of the Lander Street Storm Drain referenced in Mayor Royer's letter.

While the events of the past two years indicate that this major source of lead has been eliminated, the remaining question to be addressed is the fate of the lead which has been accumulating at the bottom of the river in the vicinity of the storm drain outfall. Should the contaminated sediments be dredged and disposed of, or should they be capped, or should they be allowed to remain and gradually be covered with non-contaminated sediment?

The storm drain cleaning is but one of a number of significant developments which should result in improvements to the sediment conditions in the West Waterway of the Duwamish. Others include:

- Elimination of Wyckoff as a non-point source of PAHs and heavy metals.
- Lockheed Shipyard no longer sandblasts on their drydocks, eliminating a potential source of heavy metals.
- Paint overspray containment at Lockheed curtails a potential source of heavy metals and organic solvents.
- Removal of sandblast storage area at Todd from the banks of the river eliminates a potential source of heavy metals.

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November 30, 1984  
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- Todd constructed a \$2.8 million sandblast facility for new ship construction, curtailing a potential source of heavy metals.
- Several smaller housekeeping measures have been identified and implemented at various smaller industries as a result of Metro's on-site visits, curtailing sources of heavy metals, PAHs and PCBs.
- Near future cleaning of the Florida Street storm drain will eliminate a historical source of PAHs, heavy metals, PCBs.

The same critical questions raised by Mayor Royer can be applied to these achievements: How much is enough? Have we done all that we can and, if not, what else do we need to do?

Given the lack of adopted, accepted standards for sediments, Metro has established a goal for the Duwamish of a healthy bottom fish population and sediment levels no worse than those found at Four-Mile Rock. In order to answer the above questions, it is necessary to develop a program to measure the degree of success achieved as a result of the above listed improvements. Metro feels this can be best achieved through an extended monitoring program of Duwamish sediment and biological monitoring of the bottom fish community.

Specifically, Metro is proposing that EPA commit to a five year program of annual monitoring of 46 stations in the Duwamish. EPA established the data base with such monitoring in 1982 and 1983. Given the sedimentation rate of this area of the Duwamish, annual monitoring of the top two centimeters of sediment through 1989 will provide the information necessary to measure improvement to the sediment. We also propose that NOAA continue its biological monitoring of the Duwamish. We would welcome your support of our request to NOAA.

We are proposing this at this time for two reasons: First, the Mayor of Seattle has raised the significant question of "delisting" a Superfund site and, second, because this monitoring effort should be a key component of an Elliott Bay action plan as it is developed by the Puget Sound office.

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I look forward to your thoughts on this proposal, and if I can provide any assistance to your agency, please do not hesitate to call me.

Very truly yours,



John F. Spencer  
Director of Water  
Pollution Control

JFS:mb

cc: Ms. Carol Jolly  
Puget Sound Action Office

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